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BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

FIFTH ANNUAL INSECT SURVEY
OF THE COEUR D'ALENE NATIONAL FOREST
1933

by
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FIFTH ANNUAL INSECT SURVEY
OF THE COEUR D'ALENE NATIONAL FOREST
1953

Although nearly all previous reports of the mountain pine beetle infestation (Dendroctonus monticolae Hopk.) of the Coeur d'Alene National Forest have contained a brief summary of the insect-control projects and the recurrent infestations, it is included in this report for convenience.

The infestation of the mountain pine beetle in this area has been known to exist for a number of years; however, except for an experimental project on Independence Creek in 1924, control measures were first recommended by the Bureau of Entomology in 1929, when an outbreak of epidemic proportions was discovered in Steamboat Creek. Accordingly, during the spring of 1929 control measures were instituted, and 1,074 infested trees, or 43 per cent of the infestation, were treated. Further work that season was abandoned because of the lack of funds. During the following summer and fall a complete survey of the white pine stands was made, and it was found that the infestation existed in an epidemic stage throughout the forest, with heavy centers in the Yellow Dog, Big Elk and Potter Creek drainages. Control measures were recommended to cover the entire white pine stands of the forest, and \$150,000 were appropriated for the project. During this project, which took place in the spring of 1930, 22,841 infested trees were treated. An insect survey the following summer showed a 57 per cent decrease in the infestation, but all of the units were reinfested to some extent. Recommendations were again made, and in the fall of 1930

and the spring of 1931 further control work was carried on. Annual surveys were made during 1931, 1932, and 1933, and following each survey the more heavily infested centers have been treated.

Although the total number of insect-attacked trees has increased from year to year, with the exception of 1930, the infestation is of a different nature, and can no longer be classed as an epidemic such as existed in 1929. The infested trees are now scattered throughout the forest and seldom occur in groups, whereas in 1929 and in 1930 they were found in rather large groups of heavily infested trees.

The following table will show the trend of the infestation from year to year:

TABLE I

	1929	1930	1931	1932	1933
Estimated on forest	25,904	9,327	12,505	15,007	19,332
Recommended for treatment	25,904	7,517	7,477	6,592	1,281
Treated					(1)
(Following spring)	22,841	7,116	7,906*	6,639*	887 (Fall)
* Includes previous fall's work					

(1) About 200 trees were left untreated because they contained a high per cent of parasites.

Table I shows that fewer trees have been recommended for treatment each year, for even though the total infestation has increased, control measures have been recommended only for the areas of heavy, concentrated infestation. The condition of the broods within the trees and the general condition of the stand have also been considered.

The impression gained upon examining the mountain pine beetle infestation on the Coeur d'Alene Forest and comparing it with the infested trees on other forests is that the infestation has not

increased but the host material has; and it seems that more trees have been attacked by fewer beetles. The increasing amount of host material was first noticed during the 1932 survey, when the infested trees on the Sissons' unit, although quite numerous, were not very heavily attacked. The trees lacked resistance to even a very light attack, and it seemed that some other agent was contributing to the destruction of the timber. Few of the infested trees were attacked on more than one side, and a large number of the trees were found to be faded without any evidence of insect work.

Any thought of control seemed useless in an area where such a condition prevailed; accordingly, it was decided to abandon control measures for the time and to watch for further developments within the area. The 1933 survey of the unit showed 109 per cent increase in the number of trees attacked, but an examination of some of the infested trees showed that only 20 per cent of the infested trees were thought to have been killed primarily by the mountain pine beetle. The remaining 80 per cent were weakened by honey root fungus or some similar agent. Examination of infested trees on the Yellow Dog unit showed a still higher per cent of defect. The stands on both of these areas are badly infected with the honey fungus, and faded trees are much in evidence. The fact that only a small per cent of the weakened trees are attacked by the mountain pine beetle would seem to indicate that the infestation is not in a dangerous state; otherwise, all this weakened material would probably be attacked. Similar conditions exist on other units, especially in the Steamboat drainage. Notes as to the per cent

of the standing infested trees infected with honey fungus or defective by some similar cause were kept on 13 units, and they are presented in the following table. The units on which no notes were taken are probably comparable.

TABLE II

Unit	: Total N.A. : : on : : unit	: % of : : total are : : windfalls	: % of the : : remaining : : N.A. are dof.	: Total Non- : : defective : : new attacks
Yellow Dog R.	: 824	: 42	: 90	: 48
Sissons'	: 1,203	: 17	: 80	: 200
Cabin Cr.	: 910	: 54	: 50	: 209
Hawksite	: 1,054	: 62	: 71	: 116
Copper Cr.	: 412	: 25	: 54	: 142
Can Cr.	: 97	: 75	: 100	: 0
Taylor's Camp	: 806	: 35	: 62	: 46
Big Elk	: 848	: 52	: 16	: 346
Potter Cr.	: 699	: 37	: 35	: 286
Stewart Cr.	: 139	: 25	: 66	: 35
Leiberg Cr.	: 89	: 33	: 50	: 30
Laverne Cr.	: 118	: 0	: 60	: 47
Honeysuckle	: 436	: 33	: 64	: 105
Total	7,635	45	62	: 1,610

The above table shows that nearly 80 per cent of the total infestation is made up of nonresistant material such as windfalls and defective trees (by defective is meant trees in which it is evident that the mountain pine beetle is not the primary cause of death).

of examinations were made because tools necessary for lower examinations were not carried. Had it been possible to examine every infested tree thoroughly, a still higher per cent of defect would, no doubt, have been found. No data were taken on the Cascade unit during the survey, but during the fall control work about 30 per cent of the standing infested trees were found to be infected with honey fungus.

Much has been said about infested windfalls, and there is some doubt as to the part they play in the course of a bark-beetle epidemic. When they occur in large concentrated groups as in a severe blow-down, they are regarded as a dangerous source of reinfestation; however, when they occur as individual trees, widely scattered, they are not usually regarded as constituting a serious menace. Although windfalls have practically no resistance, and the attacking insects are able to construct their galleries unrestricted, it has been found that the brood is more highly parasitized. During the 1933 survey, 116 infested windfalls were examined, and an average of 21 per cent of parasitism was found. This figure is probably low, as counts taken in the late summer and fall are not very accurate, because at that time many of the parasites are too small to be noticed. Also a higher per cent of the brood will be found to be parasitized the following spring because of the continual feeding habits of some of the parasites. Our present policy is to leave untreated all infested trees containing 20 per cent or over of parasites during fall control and 30 per cent or over during spring control; therefore, it would seem that infested windfalls need

Only brief examinations were made because tools necessary for lower root examinations were not carried. Had it been possible to examine every infested tree thoroughly, a still higher per cent of defect would, no doubt, have been found. No data were taken on the Cascade unit during the survey, but during the fall control work about 30 per cent of the standing infested trees were found to be infected with honey fungus.

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not be considered as a source of reinfestation except when they occur in large groups. It is also possible that parasitism will build up in windfalls to a point where the infestation will be held down to normal.

In Table III the data secured during the 1933 survey, together with some comparison to data of former surveys, are given by units and by ranger districts. Following the table are three units which are to be abandoned during future surveys. As will be seen, the dropping of these three units will not materially change the final figures, because the units are not heavily timbered and are very lightly infested.

TABLE III

Unit (1)	Acres surveyed: 1933	N.A. per acre: 1932	N.A. per acre: 1933	% infested: 1932	% infested: 1933	Total N.A. per unit: 1933	% of increase: 1930: 1931: 1932
<u>Little River District</u>							
Forks							
30,--,32,--	1,100	.154	.099	73	57	109	+37: -25 : -36
Tom Lavin							
30,--,32,--	3,000	.101	.095	53	75	285	0: +12 : -6
Iron Cr.							
30,--,--,--	4,120	.102	.164	86	68	676	-62: +427 : +61
Cascade (2)							
30,--,--,--,34	4,640	.092	.352	43	52	1,633	+6: +11 : +283
Catheart							
30,--,--,33	3,200	.237	.058	33	0	186	-29: +427 : -75
Picnic							
--,--,--,--	1,680	.091	.111	29	0	186	-47: +42 : +22
Honeysuckle							
30,--,--,33	5,320	.160	.082	31	33	436	+24: +181 : -49
Leiberg							
30,--,32,--	4,440	.101	.020	83	33	39	+283: -51 : -30
Laverne							
30,--,32,33	2,560	.123	.046	44	0	118	+63: +45 : -63
Copper							
--,--,--,--	4,000	.105	.103	53	25	412	+199: -35 : -2
Total	34,080	.135	.121	53	45	4,130	+45: +45 : -12

(1) The figures show the years in which control measures were applied.

(2) Cascade includes 1,000 acres in Barney Cr. which have 137 inf. trees.

TABLE III (Cont.)

Unit	: Acres :		: N.A. per :		: % :		: Total :		: % of increase :		
	: surveyed:		: acre		: windfalls :		: unit		: 1930: 1951: 1932		
	: 1935	: 1932:	1933:	1932:	1933:	1932:	1933:	1933	: 1931:	1932:	1933
<u>Grizzly Mountain District</u>											
Taylor											
30,31,32,--	: 2,800	: .054:	.283:	80	: 85	: 806	: +130:	-57:	+433		
Fork-Cabin											
29,30,31,--,33:	5,440	: .131:	.278:	34	: 67	: 1,512	: -41:	+220:	+112		
Can Creek											
30,31,32,--	: 1,780	: .087:	.055:	0	: 75	: 97	: -48:	-45:	-37		
West Fork											
30,31,--,--	: 5,980	: .103:	.176:	76	: 41	: 697	: -7:	+145:	+71		
Clay Creek											
29,30,31,--,33:	2,320	: .167:	.246:	55	: 39	: 571	: -11:	+210:	+47		
Lower Cougar											
30,31,32,33	: 3,600	: .150:	.189:	60	: 54	: 680	: +105:	+24:	+26		
Upper Cougar											
--,31,--,33	: 3,700	: .141:	.116:	83	: 91	: 425	: +39:	+168:	-18		
Humblebee											
30,31,32,--	: 3,040	: .030:	.152:	20	: 25	: 462	: +163:	-82:	+407		
Total	: 26,620	: .111:	.197:	57	: 60	: 5,250	: -36:	+132:	+77		
<u>Shoshone District</u>											
Sissons'											
30,31,32,--	: 4,700	: .122:	.256:	15	: 17	: 1,203	: -34:	-33:	+109		
Keeler Cr.											
--,31,--,--	: 900	: .125:	.161:	25	: 60	: 145	: -5:	-58:	+29		
No. Yellow Dog											
30,31,32,33	: 840	: .360:	.375:	61	: 95	: 315	: :	+57:	+4		
Yellow Dog R.											
30,31,32,33	: 2,140	: .584:	.385:	8	: 42	: 824	: +190:	+25:	-34		
Yellow Dog Cr.											
30,31,32,33	: 4,120	: .133:	.075:	40	: 55	: 309	: -50:	+93:	-44		
Downey Cr.											
30,31,32,33	: 4,180	: .154:	.199:	30	: 29	: 828	: -31:	-7:	+29		
Flat Cr.											
30,31,32,33	: 4,120	: .221:	.224:	41	: 50	: 923	: -36:	+176:	+1		
Bennett Cr.											
30,31,32,33	: 580	: .161:	.500:	90	: 100	: 290	: :	+475:	+210		
Brett-Minor											
30,31,32,--	: 1,550	: .109:	.125:	50	: 73	: 194	: +411:	-18:	+15		
Rock City											
30,--,--,--	: 1,600	: .031:	.300:	100	: 66	: 480	: -35:	+90:	+368		
Hawksite											
--,31,32,--	: 8,780	: .035:	.120:	41	: 62	: 1,054	: +42:	-75:	+243		
Cabin Cr.											
--,31,--,--	: 7,000	: .021:	.130:	40	: 54	: 910	: -24:	-69:	+519		
Falls Cr.											
--,--,--,--	: 2,600	: .040:	.159:	50	: 60	: 413	: :	+14:	+297		
Eagle Cr.											
--,--,32,--	: 3,540	: .066:	.064:	30	: 33	: 227	: +251:	-67:	-3		
Total	: 46,630	: .126:	.174:	40	: 50	: 8,115	: 0	: 0:	+38		

TABLE III (Cont.)

Unit	:		:		%		:Total :		: % of increase		
	:Acres :		: N.A. per :		: infested :		: H.A. per :		: 1930: 1931: 1932		
	: surveyed:		: acre		: windfalls		: unit		: 1930: 1931: 1932		
	:1933	: 1932:	1933:	1932:	1933:	1933	:1931:	1932:	1933		
<u>Forks District</u>											
Big Blk											
30,---,---,---	: 4,960	: .081:	.171:	72	: 52	: 848	:-100:	+100:	+111		
Potter											
30,---,---,---	: 3,800	: .082:	.184:	7	: 37	: 699	: -5:	-10:	+124		
Stewart											
30,---,---,---	: 2,200	: .111:	.063:	100	: 25	: 139	: -31:	-11:	-43		
Upper Flat											
30,---,---,---	: 3,680	: .041:	.041:	33	: 40	: 151	: +7:	-7:	0		
Total	: 14,640	: .076:	.125:	72	: 43	: 1,837	: -26:	+41:	+62		
GRAND TOTAL	:121,950	: .120:	.153:	51	: 51	: 19,332	: +14:	+20:	+32		
W.Fk. Eagle											
---,---,---,---	: 1,230	: .061:	0:	50	: 0	: 0	: +33:	-49:	-100		
Delaney Lind.											
---,---,---,---	: 3,200	: .070:	0:	17	: 0	: 0	: -60:	+433:	-100		
Black Canyon											
---,---,---,---	: 1,000	: .043:	.037:	100	: 100	: 87	: :	-19:	+50		
Total	: 5,430	: .063:	.016:	35	: 100	: 87	: :	:	-75		

When the general conditions which prevail throughout the forest are considered, Tables I and III, although reasonably accurate as to the actual number of infested trees, do not present the infestation in its true form. The 25,904 trees estimated in 1929 were practically all standing, heavily attacked trees; since 1931 the reinfestations have been, to a large extent, in windfalls. Out of 477 infested trees examined during the 1933 survey, only 30 per cent were classed as being heavily attacked, and even the heavily attacked trees would not compare with the infested trees found in an epidemic of large proportions.

Of the 19,332 infested trees on the forest - which are less than 1 per cent of the stand - over half are windfalls; and if the data given

in Table II are considered comparable to the conditions on the entire forest, there are only about 2,000 non-defective standing trees that were attacked during 1933.

When the per cent of the stand infested is considered, the condition does not seem to be so bad. Last year .61 of one per cent of the stand was infested; this year .83 of one per cent of the stand is infested. In the areas that have always had the heaviest infestation, as taken from the infested trees per acre, namely, the North Yellow Dog, Yellow Dog River, Yellow Dog Creek, and Downey Creek, only .54 of one per cent of the stand was infested last year and .46 of one per cent this year. Windfalls were considered as stand when infested, and are included in the .46 of one per cent. If they were eliminated, it would reduce this figure by nearly 50 per cent, and as it was found that 90 per cent of the standing infested trees in the Yellow Dog River unit were being killed primarily by some other agent, only a very small portion of the green, healthy stand is being destroyed by the mountain pine beetle.

Table IV will show the units on which control measures were applied either in the fall of 1932 or in the spring of 1933 to combat the 1932 infestation. These treated units are given with the untreated units, and the table gives a comparison of the 1933 increase or decrease. As will be seen, 7 out of 13 of the treated units increased to some extent, while 15 out of 22 of the untreated units showed an increase. The figures can not be used as a measure of the success of control, for there are too many other factors that influence the infestation of trees.

... of the stand are probably the most important. However, the figures do indicate the influence of control. It must be remembered that the treated units had a heavier infestation before the institution of control, and would ordinarily be expected to show a higher per cent of increase had no action been taken.

TABLE IV

TREATED UNITS				UNTREATED UNITS			
Unit	% :Inc.:	Unit	% :Dec.:	Unit	% :Inc.:	Unit	% :Dec.:
Forks-Cabin	:112	Cathcart	: 75	Iron Cr.	: 61	Forks	: 36
Clay Cr.	: 47	Honeysuckle	: 49	Cascade	:283	Tom Lavin	: 6
Lower Cougar	: 26	Laverne	: 63	Picnic	: 22	Leiberg	: 30
N. Yellow Dog	: 4	Upper Cougar	: 18	Taylors	:433	Copper Cr.	: 2
Downey Cr.	: 29	Yellow Dog R.	: 34	West Fork	: 71	Can Cr.	: 37
Flat Cr.	: 1	Yellow Dog Cr.	: 44	Bumblebee	:407	Eagle Cr.	: 3
Bennett Cr.	:210			Sissons'	:109	Stewart Cr.	: 43
	:			Keeler Cr.	: 29		:
	:			Brett-Miner	: 15		:
	:			Rock City	:368		:
	:			Hawksite	:243		:
	:			Cabin Cr.	:519		:
	:			Falls Cr.	:297		:
	:			Big Elk	:111		:
	:			Potter Cr.	:124		:
7		6		15		7	

CONCLUSIONS

Past experience seems to prove that control measures are not very successful in reducing the infestation below a certain point, and that the heavier the infestation the greater the chance of securing a satisfactory reduction. Perhaps during past projects an attempt was made to reduce the infestation to too low a point, and the insects have maintained an endemic level comparable to the amount of highly susceptible host material available.

After considering all the factors which enter into this rather complicated problem, it was thought best to wait until more knowledge is gained of this combined Armillaria-bark beetle condition before recommending further control. In all probability there will be an increase again next year - an increase can be expected under such conditions, but it is doubtful if it will be of serious proportions. An increase in natural controlling factors such as parasites and other natural enemies can also be expected. With an increase in the natural enemies and the possible elimination of weakened host material, it is hoped the infestation will return to normal.

COST ANALYSIS
OF COEUR D'ALENE SURVEYS

	1930	1931	1932	1933
Transportation	: \$ 418.75	: \$ 439.70	: \$ 81.50	: \$ 104.50
Subsistence	: 256.16	: 183.79	: 118.65	: 129.71
Labor	: 1,190.68	: 1,050.08	: 1,213.01	: 706.91
Total charge	: \$1,865.59	: \$1,673.57	: \$1,413.16	: \$ 941.12
Contributed time	: None	: 357.50	: 216.80	: 212.50
Total field cost	: \$1,865.59	: \$2,031.07	: \$1,629.96	: \$1,153.62

TIME ANALYSIS
OF COEUR D'ALENE SURVEYS

	1930	1931	1932	1933
Total man-days	: 247	: 315	: 359	: 342
Cost per man-day	: \$7.55	: \$6.44	: \$4.31	: \$3.37
Cost per acre surveyed	: \$0.017	: \$0.0159	: \$0.0128	: \$0.0095
Effective paid man-days	: 137	: 139	: 159	: 137
Noneffective paid man-days	: 110	: 113	: 140	: 125
Contributed effective man-days	: None	: 45	: 26	: 16
Contributed noneffective man-days	: None	: 18	: 14	: 64
Total effective man-days	: 137	: 184	: 185	: 153
Total noneffective man-days	: 110	: 131	: 154	: 189
Miles of sample strip	: 572	: 772	: 773	: 626
Miles of sample strip per effective man-day	: 4.17	: 3.92	: 4.13	: 4.09
Miles of sample strip per total man-day	: 2.31	: 2.29	: 2.28	: 1.84

The cost of insect surveys has decreased mainly because road development within the Coeur d'Alene Forest has greatly reduced the cost of transportation. It may be interesting to note the saving in this small survey project. During 1930 and 1931 it was necessary to use pack stock to cover the forest properly, but during the last two years trucks and passenger cars have been used. It would have been possible to reduce the survey cost still further in the past two seasons had it been possible to work the units in proper rotation with the shortest possible moves and with the least waste of time. However, it was necessary to secure data from the more important units first, so that control measures could be applied early in the fall had it seemed feasible to do so.

The 64 noneffective contributed man-days used during the past season included 46 days contributed by the C.C.C., as one of these men was used as a cook.

In addition to the \$941.12 spent on the survey, \$108.91 were used during the fall control project in checking and on an experimental survey of the Cascade unit, when an attempt was made to form an estimate of the number of infested trees from the per cent of stand rather than from the usual sample-strip method.

Respectfully submitted

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Approved:

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